
POST TRAUMA VISION SYNDROME

Post Trauma Vision Syndrome (PTVS) is the most common visual sequel of mild Traumatic Brain Injury (mTBI).¹ While termed mild, the symptoms and impact on life can be anything but. MTBI includes concussions, minor head trauma, minor head injury, whiplash, and more. Frustratingly, our current limitations in imaging most often mean that nothing is seen on a CT Scan or MRI.² Unresolved post trauma vision syndrome will significantly impede the therapeutic processes provided by occupational therapists and physical therapists.

PTVS is a constellation of signs and symptoms that may include:²

Conditions:

- Problems with the focusing mechanism (accommodation)
- Tracking (ocular motor function)
- Delayed visual memory/processing
- Convergence (how the eyes come together),
- Visual spatial distortions (visual-vestibular) along with associated neuro-motor (visual-motor output) deficits.

Common Symptoms:²

- Poor balance
- Headaches/migraines
- Inability to concentrate (reading/computer or even conversation)
- Dizziness/nausea
- Inability to tolerate crowded or busy places
- Disorientation
- Fatigue
- Delayed visual memory

Many of these symptoms are seen in Post Concussion Syndrome.

Conditions:

Ocular Motor Dysfunction (saccade or pursuit dysfunction)

Ocular motor dysfunction (oculomotor dysfunction) refers to inaccurate tracking of the eyes. This can happen at a level of being unable to track from finger to finger, or being unable to track accurately through targets on a page. Although there may be full ocular movements and no limitations in gaze, there may still be significant impairment to optimal ocular motor function regarding accuracy and speed of eye movements.² Accurate reaching (eye-hand), navigating through space, and reading require speed and accuracy of eye movements, and will be compromised if ocular motor dysfunction persists.^{3,4-8} Unresolved ocular motor disturbance will significantly impeded the therapeutic processes provided by both occupational and physical therapists.²

Binocular Dysfunction

Problems with binocular vision are common secondary to ABI.^{2,9-13} Binocular dysfunction refers to an inability to accurately use the two eyes together. There are varying levels, and many cases will pass ‘routine’ eye testing. They can be severely disabling to a person’s ability and performance in many

activities of daily living.² Some of the affected areas include posture, balance, ability to move through space, reading, driving, and playing sports. Binocular dysfunction can cause many negative symptoms such as headaches, dizziness and inability to sustain focus. Unresolved binocular disturbances will also significantly impede the therapeutic process of both occupational and physical therapists.²

Convergence Insufficiency

Convergence Insufficiency means that there is an inability to appropriately use the eyes together at near. This may mean a complete inability to converge, or an inability to sustain convergence through standardized stress tests (base out prism). Convergence Insufficiency will impact ability of all tasks at near.² Common symptoms may include but are not limited to: words running together or blurring while reading, double vision, headaches, falling asleep when reading, reduced reading comprehension.²

Convergence Excess

Convergence Excess means that the eyes cross over each other too much when doing a near task. This can cause many symptoms such as headaches, dizziness, nausea, reduced reading speed/comprehension and more.

Visual Midline Shift

A visual midline shift represents a problem with egocentric localization.² This relates to a poor visual understanding of where objects in space are relative to one's self. Most simply put, an inaccurate understanding of where straight ahead is.¹⁴⁻¹⁶ Symptoms can include veering when walking, inaccurate hand-eye coordination and more.

Visual Vestibular Mismatch

Central vestibular processing relies on input from the visual system. If the visual system is not accurately processing movement and spatial information, the information it gives the vestibular system will result in vestibular type symptoms. The visual conditions will impede vestibular rehabilitation therapy because the visual system will continue to interfere. Symptoms can include dizziness, nausea and balance problems.

Accommodative Dysfunction

Insufficiency of accommodation is common after brain injury, even with young people^{9,17} It refers to the inability or inaccuracy of the brain to control where the lens of the eye is focused, or the inability to accurately change the focus of the lens within normal ranges. Symptoms can include things such as blurred print, difficulty reading, and headaches.

What is Neuro-Optometry

Adapted from: Suter PS, Harvey LH. Vision Rehabilitation: Multidisciplinary Care of the Patient Following Brain Injury. Boca Raton, FL: CRC Press, in press.

Neuro-Optometrist

The neuro-optometrist is an optometrist who has special training in the neurological aspects of the visual system. The neuro-optometrist not only diagnoses general eye health problems and corrects refractive errors to improve visual acuity but also carefully assess functional binocularity, spatial vision, and visual processing abilities. Neuro-optometrists diagnose injury-related gross ocular and perception impairments, provide education regarding functional implications of visual diagnoses, and recommend

treatment and compensatory strategies to speed rehabilitation. Treatment often includes prescription of specialty lenses and prism for improved performance in rehabilitation activities and reduced symptoms in daily living. Many neuro-optometrists work with trained vision therapists in their office to implement in-house vision rehabilitation therapy programs. In addition, some specialize in low vision, and intervene when low vision aids are needed secondary to reduced central vision, blindness, or cortical visual impairment that does not resolve with therapy.

Please note that at our clinic, we refer all ocular health exams to general practice optometrists or ophthalmologists. This allows us to spend our time where it is of best service to our patients.

Treatment:

Vision Rehabilitation/Therapy

Vision rehabilitation was commonly thought of as helping patients with low vision (poor ability to see clearly) with devices and accommodations. It is now being defined as rehabilitating the pathways in the brain responsible for how the eyes track, work together, and how the brain uses the visual information for depth/space and vestibular integration.² Vision rehabilitation allows for the previous conditions to be addressed in ways that improve function and reduce symptoms.² There is a wide variety of ‘vision rehabilitation’ or ‘vision therapy’ that is offered, and the discerning practitioner is recommended to ask individual practitioners about their approach, success rates, and references.

A large amount of the information adapted from: Suter PS, Harvey LH. Vision Rehabilitation: Multidisciplinary Care of the Patient Following Brain Injury. Boca Raton, FL: CRC Press, in press.

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